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THE PRESENT STATE

OF THE

THEORY AND PRACTICE OF MEDICINE:

AN INTRODUCTORY LECTURE
TO THE CLASS OF THE INSTITUTES OF MEDICINE
IN THE UNIVERSITY OF EDINBURGH.

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LECTURE.

Gentlemen,—

The science which it is my duty to teach from this Chair, comprehends the Institutes or Principles of Medicine—that is to say, what is known of the functions of the animal economy in its embryological, its histological or structural, its physiological or healthy, and its pathological or diseased conditions.

Before entering on this study, however, I propose, by way of introduction, to direct your attention to the relation it bears to other branches of knowledge, and especially to the influence it is now exercising on the medical art, which most of those present, I presume, are about to cultivate as a profession.

If we regard the whole field of human knowledge, and reflect on the differences which exist among the various sciences, we must insensibly be led to classify them into two great divisions. All the sciences belonging to the first class are characterised by the possession of a primitive fact or law, which, being applicable to the whole range of phenomena of which the science consists, renders its different parts harmonious, and the deductions of its cultivators conclusive. Thus, the physical sciences possess a primitive fact, in what is called the law of gravity. It was Sir Isaac Newton who first demonstrated, by a happy effort of genius, that all the planets in our system gravitate towards the

sun, by the same laws, and in consequence of the same principle, by which bodies on the earth gravitate towards its centre. This theory was subsequently found applicable to a vast number of circumstances, and by it the philosopher now explains many of the material phenomena of the universe, and the astronomer calculates the movements of the heavenly bodies. This law applies itself to all the facts of which physical science is made up. In the same manner, chemistry possesses a primitive fact in what is called the law of affinity, discovered later by Lavoisier. If we mix two salts which mutually decompose each other, a third salt is formed by the union in definite proportions of their constituent elements. This, in the language of chemists, is brought about by chemical affinity. Did we repeat the experiment a thousand times, the same result would take place, and the same law which applies in one case, is found universally applicable to every phenomenon in chemical science. The possession of this primitive fact, then, communicates the greatest accuracy and precision to the sciences which possess it, and on this account they are called the *exact* sciences.

But there are other sciences, which are altogether destitute of a primitive fact; which consist of groups of phenomena, each of which may or may not be governed by a particular law. Such a one is agriculture. No man, however skilful, can till the ground, can cultivate the soil, and be certain of the same result on every occasion. Numerous circumstances, over which he has no control, may destroy his anticipations and show the fallacy of his calculations, and this, after every known condition has been fulfilled, and every possible degree of prudence and sagacity has been exercised to ensure success. The same means, apparently, which operate at one time fail to do so at another. Such sciences, then, are denominated *inexact* sciences, and it is to this class that medicine belongs.

Now, the cultivators of medicine always *have* been, and are still endeavouring, to render the science exact, and hence at various

times different individuals have brought forward a law or primitive fact, which they have tried to show was applicable to all vital phenomena. Some have placed it in the physical condition of the solids, and others in the physical condition of the fluids. Hence the terms *solidism* and *fluidism*. A third party have sought it in the functional conditions of the body, viz., an alteration in the living force. Hence the term *vitalism*. If, for instance, we could constitute the vital property excitability, a primitive fact, it would serve the same purpose in physiology that gravitation does in physics. But we cannot do this. It is true that the stomach is excited by the food, in order that digestion be produced, and that the lungs are excited by the air during the process of aeration. But, in the performance of these functions, excitability plays a secondary part, it is only one of the elements necessary for their completion, and is utterly insufficient to account for their production. In the same manner, the mechanism of the solids or of the fluids cannot explain every known fact; so that it becomes necessary to take all three doctrines, solidism, humoralism, and vitalism, into consideration, if we wish to escape fallacy.

Of late years, it has been contended that, as far as structure and development are concerned, we do possess a law in the doctrine of cyto-genesis, that is, of the growth of those minute vesicles or cells, of which we find all plants and animals at one period of their existence, to be composed. It has been argued, that if a theory of organization can be shown to apply to all animated nature; to the vegetable as well as animal kingdom; if it can be demonstrated that the humblest and minutest tribes of plants possess the same original structure as is to be found in the most gigantic trees of the forest; if it become evident that the same principle of formation is discoverable in animals, whether so minute that thousands may be contained in a drop of water, or, on the other hand, in the tissues of animals so enormous as the elephant or whale; nay, more, if it admit of demonstration,

that the organic diseases to which they are subject, that the formation of new growths, and the reparation of tissues, are explicable by the same theory as applies to the development of healthy structure, surely, it is contended, we are approaching to something like a great primitive fact which may ultimately communicate exactitude to physiological science.

And yet, notwithstanding the flood of light which has been thrown upon all departments of our science by the beautiful generalization of Schleiden and Schwann, recent researches have exhibited its insufficiency to explain all known phenomena of growth. Medicine, then, in its present state, possesses *no* primitive fact. But is it not very possible that it may do so at some future time? During the many ages that existed before Newton, physical science was as inexact as that of physiology is now. Before the time of Lavoisier, chemistry, like physiology, consisted of nothing but groups of phenomena. These sciences went on gradually advancing, however, and accumulating facts, until at length philosophers were found who united these together under one law. So medicine is destined to advance, and one day another Newton, another Lavoisier, may arise, whose genius will furnish *our* science with *its* primitive fact, and stamp upon it the character of precision and exactitude.

Although it must be confessed that we have not yet arrived at such a happy consummation, it cannot be denied that we are making rapid strides towards it. Notwithstanding those principles which Bacon introduced into the study of science, it is only lately, from the advance of collateral branches of knowledge, that we have been enabled to catch glimpses of a correct philosophy as applied to physiology. A truly rational medicine is yet to be created—for all the processes of life, both in its healthy and diseased conditions, are really owing to the structures which have been only lately made visible by the improvement in optical instruments. We know also, that these processes are connected with physical and chemical changes, the importance of which we

are just commencing to estimate. But now, assured of what is really necessary, and guided by rigid observation and experiment, rather than a vague hypothesis, physiology and pathology are advancing with such rapidity, that every year revolutionizes the ideas which sprang up in the one which preceded it. Moreover, it has been satisfactorily shown, that the branch of science which refers to vital phenomena, bears such a relation or correlation to various branches of *physical* science, that the whole is gradually becoming more simple, instead of more complex. Instead of physiology being isolated under the idea that its laws are peculiar, it is every day becoming more evident, that vegetable and animal life are dependent on conditions, which, strictly speaking, are elucidated by the geologist, botanist, zoologist, chemist, and natural philosopher. In short, the union of the natural sciences seems to be near at hand.

To illustrate this remarkable fact with sufficient detail, would occupy me too long. But I can shortly allude to some of the circumstances which will support the statement I have made.

Thus, natural philosophy has opened up to us the wonderful influence continually exerted by electricity, galvanism, magnetism, caloric, light, and other forces upon the living organism. It has disclosed to us the laws of imbibition, capillary attraction, endosmose, and exosmose, without which we should scarcely be enabled at present to understand numerous processes going on in the vegetable and animal tissues. It investigates the laws of acoustics, which it is necessary to know, in order to comprehend how voice and speech are produced, and the sense of hearing carried on. It comprehends the science of optics and the mechanism of the eye, and has thereby furnished us with that wonderful instrument, the microscope, by means of which the physiologist has been made acquainted with the minute structure of organs. Indeed, a knowledge of natural philosophy is more intimately connected with a sound medical education than many suppose.

Chemistry, as applied to physiology, is only in its infancy, but already it is apparent, that most of those conditions on which the continuance of animal life depends, are explicable only by the application of this science. The functions of alimentation, digestion, respiration, and excretion, are for the most part chemical processes, and the disturbance of these functions, constituting diseases, is frequently remedied by the application of chemical agents. But chemistry has done more than this, for, combined with botany, zoology, and geology, it has pointed out the relation of animals to vegetables, and the connection between them and the physical world.

Thus, the primitive atmosphere and mineral constituents of the globe furnish food for plants. Under the form of heat, these plants receive from the sun, the force which enables them to convert this food into vegetable structure. Animals again assimilate or absorb the organic substances which plants have formed, and they alter them by degrees into a condition, which again admits of their restoration to the air and to the earth. In this vast process, death is quickened, and life appears. There is an eternal round, in which matter merely changes its place and form, now mineral, then vegetable, anon animal, and now mineral again.[1]

The science of physiology, which embraces contemplations of this nature, is rendered further interesting and more elevated, by the necessity of regarding other phenomena, which are present in the higher forms of animal life. It has to investigate the laws regulating those noble faculties by which the human mind, mastering all that surrounds it, bending all the forces of nature to its wants, has by degrees made empire of the earth, of the ocean, of the whole globe, which we inhabit. Here physiology mingles with moral philosophy, which teaches us the influence of thought and of the passions upon mankind. Nay,

[1] Dumas on the Balance of Organic Nature.

more, it is scarcely possible, when entering upon this subject, to avoid certain speculations connected with a still higher science, viz., theology, and the mighty doctrines which have been put forth regarding a future condition of existence. And here, allow me to say, that physiology is in no way opposed to such doctrines. True, it can offer no proof either one way or the other; but in watching the development of man from his embryo state, we can scarcely avoid observing the wonderful difference between his condition as an ovum, and that in which all his organs and faculties have reached perfection. And if the same creature can exist in two states, so utterly distinct, there can, I conceive, be no difficulty in supposing, even physiologically, that there may be still another condition, which although inappreciable to our senses, and incomprehensible to our minds, may in reality constitute no greater difference to what we are now, than the adult man exhibits when compared with the granules of oil and albumen, out of which he was developed.

Be this as it may, you will observe that the science you are about to study, demands your attention, not only on account of the interesting topics peculiar to itself, but because it is intimately associated with all the natural and moral sciences. Even when viewed alone, perhaps, there is no single branch of knowledge so eminently fitted to extend the reasoning powers, to enlarge our conception of material things, or to elevate the mind, by the exercise of its noblest faculties, as the one which will engage our thoughts during the present session.

It is not, however, as a mere individual science, or as a barren though interesting subject for mental study, that you attend a course of the Institutes of Medicine. With you, I apprehend, as with myself, it constitutes a groundwork for the practice of an art. It is in this point of view I am most anxious you should consider physiology and pathology. For, gentlemen, I trust that, in studying this, as all other subjects, you will never lose sight of the important fact, that you are medical students, and that as

such, your ultimate object is to acquire an art, in other words, a knowledge of all those means which are directed to the prolongation of life and cure of diseases. It is not essential for you to become profound natural or moral philosophers, chemists, geologists, or botanists, although a general knowledge of the natural and physical sciences is valuable and well adapted to improve your reasoning and observing powers. What is expected of you, and what you must endeavour to obtain from your whole series of studies, is such an amount of learning, and such an available kind of information, that you may undertake the serious duties of a medical practitioner, with credit to yourselves and advantage to the public.

Now, in order that you may successfully accomplish this great object, it is of all things necessary that you should appreciate properly the importance of theory in its bearings on practice, in order that when you are called upon to treat the sick, you may be ready to take advantage of all the experience which you may obtain. Cullen said, ninety years ago, " Every one now-a-days pretends to neglect theory and to stick to observation. But the first is in talk only ; for every man has his theory, good or bad, which he occasionally employs ; and the only difference is, that weak men, who have little extent of ability for, or who have had little experience in, reasoning, are most liable to be attached to frivolous theories ; but the truly judicious practitioners and good observers, are such as have the most extensive views of the animal economy, and know best the true account of the present state of theory, and therefore know best where to stop in the application of it."

If these observations were correct when Cullen wrote, they are far more applicable now, when almost every step that has been made in the practice of medicine since his day, has been owing to the result of scientific investigation. But, in order to make this proposition clear, allow me, in the first place, to distinguish carefully what is science and what is art, and then bring

before you a few striking examples of how far the latter is directly dependent on the former.

We may consider then, science to be a collection of theories; art, a body of rules. Science says, this is or is not; this is probable or improbable. Art says, do this, avoid that. The object of science is to discover facts and determine laws; the object of art is to accomplish an end and determine the means of effecting it. Science is inductive and reasons; art is imitative and exemplifies. Science is steady, certain, and progressive; art is vacillating, doubtful, and limited.

Hitherto it has been imagined that the chief, if not the only method of obtaining skill in art, is by practising it, that is, obtaining experience. In medicine this is proverbial; and every practitioner is more apt to boast of his experience than of his knowledge. In the infancy of science, indeed, we can readily understand that its hasty generalizations must have been continually overthrown and rendered ridiculous the moment they were applied to practice; and that the man who had tried, and failed or succeeded even accidentally, was a safer man to trust to, than he who speculated on imperfect data. Hence the reason why art for many ages preceded science—why dogmatic rules were more attended to than ingenious theories—and why the accomplishment of an end, even when that end was limited, was more regarded than the discovery of a new fact, or the determination of a law capable of extensive application. But, in recent times, this state of things is gradually becoming reversed. Science, in numberless instances, has advanced beyond art; nay more, science herself has worked out all the details, and made art a mere slave to her commands. Thus it was that the theory of achromatism, worked out by Euler, led opticians to make perfect telescopes and microscopes. Thus it was that Le Verrier and Adams, by calculations in their observatories in Paris and London, discovered a planet which they had never seen, but which when looked for, according to their directions from Stockholm and St Petersburg,

was immediately proved to exist in fact, as it had previously been proved to exist in theory. Thus it was that the electric telegraph, perfected in the closet of the man of science, flashed ready made on the astonished gaze of an admiring world; and thus it is that at the present moment, we see the artizan in his workshop, the explorer in the mine, the agriculturalist in his farm, nay, even the sculptor in his studio, abandoning the rules and wise saws handed down to him from ancient tradition, and accommodating himself to the revolutions which science has dictated, and those laws whereby blind experience is everywhere made to yield to an enlightened knowledge.

We may, therefore, receive as an established law, the statement, that the more any particular science is advanced, the more is the art to which it leads rendered perfect, and that the true theory of the one produces never-failing rules in the other. The art of navigation, for instance, is certain, because the science of astronomy, on which it is based, admits of exact calculation; and, in consequence, the tempest-tossed mariner, although in unknown seas, may, by his instruments, ascertain the exact spot his vessel occupies on the surface of the globe. In like manner, the only way of improving the art of medicine is to advance the science of physiology, and all that has been accomplished during the last fifty years has been brought about in this manner. In that short time have been discovered the independent properties of the nerves, the reflex functions of the nervous centres, the chemical balance of organic nature, the functions of cells, and their influence on nutrition and secretion, the laws regulating the development of the ovum, the significance of the sounds produced by the heart and lungs, and numerous other doctrines, which have tended to improve the art of medicine. But let me descend from generalities to a few striking instances of what a study of the theory of medicine has recently accomplished for the improvement of its practice.

From very ancient times the salt lakes of Fusaro have been used as nurseries for young oysters. It has been calculated that each female oyster produces, on an average, about 100,000 young, which, when they escape from the shell, appear like a thick white cloud in the water. Each minute particle is at first furnished with cilia, by means of which it swims about till it finds a surface to which it attaches itself. If this cannot be found, the cilia soon fall off, and the young animal sinks to the bottom of the water, where it becomes a prey to the polypes which are fixed there. Now, at Fusaro, it has been found that if fagots, or the dried branches of trees, are driven into the sand, so as to present to this animated dust a surface to which it may attach itself, the minute particles cling to it, as a swarm of bees cling to any projecting substance. There they become fixed, grow rapidly, so that at the end of two or three years each minute ovum becomes an eatable oyster. Then the fagots or branches are pulled out, and people gather from them, at Fusaro, a harvest of these shell-fish annually, in the same way that, in other places, they gather grapes from the vine.[1]

Facts of this kind prove that if the ova of the inhabitants of our seas could be preserved until they attain sufficient size and strength to take care of themselves, an inexhaustible supply of wholesome food might be obtained, and the wealth of a nation greatly increased. It has long been known that the salmon-fisheries in this country have been annually becoming less and less productive, so that what was formerly the food of the common people has become an article of luxury for the rich. Now, the experiments of Spallanzani demonstrated that a minute quantity of the male spermatic fluid, when diffused in water, would impregnate a multitude of ova obtained from the roe of the female frog, when sprinkled over them. This important fact has, within the last few years, been taken advantage of, with a

[1] See Coste sur la Pisiculture.

view of producing artificial fœcundation, and the experiments and observations of Shaw, Jacobi, and Coste, have demonstrated that, by squeezing the ripened ova from the body of a female fish into ponds, and then squeezing the fluid from the fully developed milt of the male fish upon them, millions of fish may be produced and preserved. The artificial ponds on the Tay, near Perth, are the means of furnishing to that river enormous numbers of young salmon produced in this manner, which go to the sea, and return, some of them with an increase of two or three pounds weight in one season. Under the direction of government in France, M. Coste is at this moment busily engaged in furnishing all the rivers of that country, not only with salmon, but with trout, and other valuable fish, developed by artificial impregnation, and transported from one place to another in the form of impregnated ova.

Here, then, is an example of how physiology has been made useful in procuring food, in increasing property, and in adding to our national resources. But, while watching the progress of the animals which have in this way been raised to supply nourishment and improve our fisheries, another curious fact has been discovered, viz., that during the progress of growth these creatures have assumed forms with which we were previously well acquainted, but which had been considered as those of distinct animals. Thus, as the result of the observations made by Mr Shaw on the artificial cultivation of salmon, it has been distinctly proved, that the par, the grilse, and the salmon, which were formerly considered distinct fish, are, in fact, only different stages of development of one animal.

The upper line of diagrams before you points out the mode of development of one of the higher mammals—the dog. If we were to compare the matured ovum at one end of the line, with the nearly completed fœtus at the other, the mind might well be puzzled to determine by what steps the first was transformed into the last. But by tracing the successive changes which take

place, we observe how, by a series of involutions and evolutions of a membrane, called the germinal membrane, how by its splitting up into three layers, each becoming thickened, and how, by then undergoing a number of turnings in and bendings out, as I shall subsequently explain, the perfect creature is formed. Now, we do not say of such a development, the whole of which is hid from us, that the different stages constitute different animals; but in those cases where the progress is not hid, strange to say, this is what has resulted. Thus, four animal forms with which zoologists have been for some time acquainted—viz., 1st, simple ciliated or non-ciliated sacs, often called *Monostomata* or *Circuriæ;* 2d, a polype with a four-sided extensible mouth—a so-called *Scyphistoma;* 3d, a compound polype, resembling a pine cone, called *Strobila;* and, 4th, the common Jelly fish, or Medusa—have been shown by Sars, the eminent Norwegian naturalist, to be only different stages in the development of one animal, the first being the free ova of the last.[1]

Again, in the intestines of various animals, tape-worms are found, creatures so different from anything to be seen out of an animal body, that it has, until lately, been a matter of great difficulty to determine how they are produced. It has long been known, however, that other parasites are found in different organs, which, from their form, have been called cystic-worms, which were supposed to be quite different from tape-worms. It now appears, however, that each mature joint of the last parasite contains about 125,000 minute eggs, which gives for an entire animal, about 12,500,000 ova. These are discharged, become dust, and are eaten or drunk by one animal, which is the natural food of another. In the first they are converted into cystic-worms constituting an early stage of development, and in the last they are formed into tape-worms, constituting a later one. Thus, the

[1] See Steenstrup on the alternations of generation.

cat is infested with a tape-worm called the *Tænia Crassicollis*, and the mouse by a cystic-worm called the *Cysticercus Fasciolaris*. The eggs of the tænia enter the body of the mouse, and are converted into the cystic-worm, and in this stage they would remain in that animal. But the mouse, being eaten by the cat, the cystic-worm of the former is converted into a tape-worm in the body of the latter. In the same way the *Cysticercus Pisiformis*, found in hares and rabbits, is converted into the *Tænia Crassiceps*, so common in the fox, which feeds on those animals, and the *Cysticercus Tenuicollis*, found in the ruminantia and squirrels, is converted into the *Tænia Serrata*, so common in the dog.

Man, like other animals, is apt to be infested by a peculiar kind of tape-worm called *Tænia Solium*, and there can now be no doubt, that this form of entozoon is a further stage of development of the *Cysticercus Cellulosæ*, so common in oxen, sheep, and especially in pigs. These animals are largely consumed by man, and where their flesh is eaten raw, as in Abyssinia, tape-worm is very common. In civilized countries, cookery destroys the vitality of the parasites before they are eaten; but if meat be underdone, or eaten out of season, a few may escape the action of cooking and of mastication, and so reach the stomach uninjured. That dogs fed on rabbits or mutton flesh, containing *C. Cellulosæ* become affected with tape-worms, has been proved by the direct experiments of Kuchenmeister.

But, you may ask, how do all such facts, interesting though they be scientifically, teach us to cure disease. At first, indeed, this is not apparent, any more than was the use of the latent theory of heat as developed by Black, or the utility of exciting spasms in a frog's limbs, by bringing them in contact with two metals, as was done by Galvani. But the theory of Black led to the construction of the steam-engine, and the barren observations of Galvani, have enabled us to unite France and England by a telegraphic wire through the ocean. And, it may be assumed, without the fear of contra-

diction, that it is such facts as I have alluded to, that are silently revolutionizing the study of medicine. Thus, if we want to cure tape-worm, it must be clear that it is not enough to give anthelmintics or purgatives; we must also prevent the eating of flesh underdone, or game and fish out of season, when it is likely to be infested with *Cysticerci.*

But animals are subject to vegetable as well as to animal parasites. Here is a drawing of a boy's head, covered with a loathsome crust, commonly known as scald-head, the *Tinea Favosa* of medical men. Its general appearance is not unlike many of the fungi and lichens which may be seen upon the bark of old trees. Careful examination proves it to be composed of the same structure as vegetable moulds in general, consisting of *thalli* or threads, giving off towards their extremities numerous *sporules* or seeds. Formerly this disease was attempted to be cured by plucking out the bulbs of the hair, with a pair of pincers, or by the barbarous practice of the *calotte.* This consisted of spreading a thick cohesive plaster over the shaved head, and when the hair had firmly grown into it, dragging it off forcibly, and so endeavouring to eradicate the disease and hair together. But even this practice failed, in the majority of cases, and at length it was thought that a great improvement had been effected by following the recommendation of the Frères Mahons, and using depilatory powders. But the discovery of the vegetable nature of this disease rendered it evident, that only those means hostile to vegetable growth would answer the purpose. For several years I have accomplished this, by simply shaving the head, and keeping the scalp smeared with oil, which, by preventing the access of atmospheric air, at once destroys the conditions necessary for the development of fungi.

Although fifteen years have elapsed since the cell doctrine of growth has been admitted into physiology and pathology, medical men have not yet realized to themselves its vast importance in a practical point of view. Professor Virchow of

Wurzburgh, indeed, has recently endeavoured to replace the doctrines of solidism, fluidism, and vitalism, by that of what he calls the cell pathology.[1] But I have taught the cell pathology for the last fourteen years in this school, and have gone further, by showing that it is no more universally applicable to the phenomena of disease than is humoralism or solidism. Indeed, we may more correctly speak of a molecular pathology, as a molecule, and not a cell, is the first and last form of organization. But molecules, in their turn, are deposited from fluids, and so we again arrive at a species of humoralism.

What, however, it is important to remember in reference to practice is, that if there be a molecular or a cell physiology and pathology, so is there a molecular and a cell therapeutics. For, it is evident, those diseases which depend on an increase or diminution of cells, can only be reached scientifically through a knowledge of those laws which govern their evolution and disintegration.

Thus growth (that is, the multiplication of cells) is favoured by increased warmth, room for expansion and moisture, and it is checked by cold, pressure, and dryness. If then, an exudation be poured out and coagulated near the surface, as it can only disappear by its passing through the stages of cell growth, we favour suppuration, that is, the growth of pus cells, by warm poultices or fomentations, and retard it by cold and pressure.

Again, pneumonia consists of an exudation into the vesicles and tissues of the lung, which coagulates and excludes the air. It is very doubtful whether a large bleeding from the arm can operate upon the stagnant blood in the pulmonary capillaries—that it can directly affect the coagulated exudation is impossible. But lowering the strength and vital power of the individual, is directly opposed to the necessary vital changes which the exudation must undergo in order to be removed by cell growth

[1] Archiv. für Patholog. Anatomie, etc., 1855.

and disintegration. Hence it is, in my opinion, that the mortality from pneumonia has diminished since large bleedings have been abandoned, and not because, as has been suggested by an eminent authority, inflammations, like fevers, have changed their types since the days of Cullen and Gregory.[1]

Again, the absorption of a pleuritic effusion depends on the formation of new blood-vessels in the coagulated exudation, which is adherent to the pleuræ. These in their turn are the results of cell formation. Can such formation be encouraged, and an absorbing instead of an exhaling surface produced, by large bleedings or by mercury?

Again, the growth of tumours may be encouraged or retarded by the same means which influence all kinds of cell development. But, if they assume a parasitic character, as in cancerous growths—that is, if the cells possess a power of multiplication in themselves—then the only chance of cure is in their complete destruction or extirpation. But the surgeon who trusts to his naked sight, forgets that germs are infiltrated among the surrounding tissues. These he cannot see from their minuteness, yet he employs no microscope to discover them. Need we wonder, therefore, that they should frequently return, or rather grow again, as in fact they have never been thoroughly removed.

The beneficial changes which have taken place in our treatment of apoplexy, syphilis, small pox, phthisis, Bright's disease, and many other disorders, might in like manner be shown either to have originated from, or to be capable of being satisfactorily explained by an advanced knowledge of physiology.

Again, notwithstanding the universality with which the stethoscope and auscultation are now received as necessary means of diagnosis, how few of our medical men, comparatively, are really skilful in detecting by them the morbid changes going on in the heart and lungs. The stethoscope, indeed, was as much abused

[1] See Dr Alison in *Monthly Journal of Medical Science*, November 1852.

when it was first introduced, as the microscope is now. Professors then existed, who taught that a piece of stick was not likely to make us discern much that was going on in the lungs, and who cautioned students against losing their time in learning auscultation, as they now do against acquiring histology. But the philosophic physician must see the necessity of using every means in his power of detecting disease, whether stethoscopical, microscopical, or chemical.

I cannot too strongly caution you not to be influenced by the opinion of those, who, educated before these means of research came into general use, speak of them as worthless, especially in the investigation and diagnosis of disease—because, in short, they are ignorant of their valne, therefore, forsooth, they can be of little benefit. I need scarcely remark, that this kind of reasoning is altogether unsound, and is directly opposed to the introduction of all improvement in either science or art. What should we think of a modern astronomer, who boasted that it was enough for him to examine the heavens with his naked eye, and sneered at telescopes? or how should we like to trust ourselves at sea to the navigator, who, as in ancient times, steered his course by the sun and stars only, and who abused sextants and other instruments by which alone exact results are arrived at? Such, however, is exactly the position of those medical men who consider stethoscopes and microscopes useless, and thns betray an unacquaintance with the present state of their own art.

At all events, we consider it our duty to seize on every means that science places in our hands, of detecting the true nature of disease, — percussion, auscultation, histology, and chemistry, will all be pressed into our service, — and whilst we spare no pains to make ourselves masters of observation, and cultivate our senses to the utmost—whilst we endeavour to unite the experience of the past with the knowledge of the present day, we shall never forget that the Medical Art is founded

on science, the only guarantee of its elevated and ennobling character, and the only secure means of its future advancement.

It was my intention to have alluded (had time allowed) to the structure of the lungs, as exhibited in the series of drawings now before you; and also to the valvular structure of the heart, with a view of showing how physiology, by unfolding the functions of those organs, had indicated, in an unmistakeable manner, not only how we ought to carry out various economic arrangements, in order to preserve health, but how we ought to treat the diseases to which they are subject. But to this I find I must refer on some future occasion. In the meantime, gentlemen, from the facts and considerations which I have offered to you, you will, I trust, see how important a place the science of Medicine ought to hold in your plan of education. They may serve to impress upon you the advantage of never neglecting a truth, merely because it does not at the time appear useful to us. Who would have imagined, fifty years ago, that by listening to the sounds of the heart, we could frequently tell the exact valve in it which is disordered, or that by microscopical examination we should have resolved some skin eruptions into a vegetable mould, and traced intestinal worms to feeding on raw meat, or fish out of season? Yet these and all the wonderful practical results which distinguish the age we live in, flow directly from scientific research and generalization.

What then characterises the present condition of medicine, is an attempt to bring our advanced knowledge of physiology and pathology to bear upon the treatment of disease, and by renewed observation, with all the aids that modern diagnosis gives us, to reinvestigate the action of our more important remedies. In so doing we should not neglect past experience, but endeavour to make the truths it has taught us harmonize with scientific laws. No one can doubt that quinine cures ague, and that lemon juice cures scurvy. Why they do so, we are at present ignorant, and hence those remedies are called specific, and given as a result

of blind experience. It has also been distinctly shown that sulphur ointment cures scabies. But here, I think, false reasoning has stepped in, and declared sulphur to be as much a specific for scabies as quinine is for ague. But scabies depends upon the presence of an insect, which lays its eggs in the skin; and the greasy matter of the ointment, by asphyxiating such insects, causes their destruction, just as well without as with sulphur. In chronic cases the eggs, however, remain, and hence other applications may be sometimes necessary, such as the Stavesacre ointment, which Bourguinion has shown to be most powerful for destroying them. But, to discover these insects, and to determine their habits, patient and long continued research was necessary, by means of the microscope, and practice now reaps the benefit of it.

It is true that the contradictory character of medical doctrine and practice has, in all times, excited the ridicule of the weak-minded, and still constitutes the ground on which Medicine is attacked by the ignorant and superficial. Yet the differences which exist, no more prove that there is no foundation for Medicine as a science, than the great variety of religious sects show that there is no truth in religion, or than the varied decisions of our courts of law, prove jurisprudence to be a farce. All these contradictions depend upon imperfect attempts at correct theory; and this latter once rendered perfect, it will be seen that both health and disease are governed by laws as determinate as the motion of the planets and the currents of the ocean. This conviction is now everywhere gaining ground, and the public are beginning to distrust the man who merely boasts of his experience and the action of his drugs, and to place confidence in him who treats according to natural laws, and simplifies his remedies. Even quackery has changed its features, and instead of deluding the so-called intelligent classes by the wonderful powder or universal pill, it spreads its destructive fallacies under the mask of startling phenomena or of some therapentic law.

But notwithstanding the discouragements which knowledge has received and will ever suffer from the indolent or narrow-minded, at no period has the tendency to cultivate scientific medicine been more strongly manifested than it is at this moment. Everywhere in Europe do we observe a noble effort to enlarge the foundations on which its practice is based. Everywhere we see Natural Philosophy advancing—enthusiastic chemists pushing forward organic analyses—anatomists, unwearied in their researches concerning development and the structure of tissues—physiologists experimenting and concentrating all the resources of modern science, in order to elucidate organic laws—and pathologists busy in connecting the symptoms observed in the living, with alterations in the minutest tissues and atoms of the dead. At this time Medicine is undergoing a great revolution, and to you, gentlemen, to the rising generation, do we look, as to the agents who will accomplish it. Amidst the wreck of ancient systems, and the approaching downfal of empirical practice, you will, I trust, adhere to that Medicine which is based on Anatomy and Physiology. If you now resolve to follow in the legitimate path of improvement to which all reason and experience invite you, be assured that the toil of mastering what is now known of correct generalization, will not be in vain. Everything promises, that before long, a law of true harmony will be formed out of the discordant materials which surround us; and if *we*, your predecessors, have failed, to *you*, I trust, will belong the honour of building up a system of Medicine which, from its consistency, simplicity, and truth, may at the same time attract the confidence of the public, and command the respect of the scientific world.

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